



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.												
10/507,524	09/14/2004	Kazuhisa Miyagawa	101249.55411US	6746												
7590 Crowell & Moring P O Box 14300 Washington, DC 20044-4300		06/21/2007	<table border="1"><tr><td colspan="2">EXAMINER</td></tr><tr><td colspan="2">DHINGRA, RAKESH KUMAR</td></tr><tr><td>ART UNIT</td><td>PAPER NUMBER</td></tr><tr><td>1763</td><td></td></tr><tr><td>MAIL DATE</td><td>DELIVERY MODE</td></tr><tr><td>06/21/2007</td><td>PAPER</td></tr></table>		EXAMINER		DHINGRA, RAKESH KUMAR		ART UNIT	PAPER NUMBER	1763		MAIL DATE	DELIVERY MODE	06/21/2007	PAPER
EXAMINER																
DHINGRA, RAKESH KUMAR																
ART UNIT	PAPER NUMBER															
1763																
MAIL DATE	DELIVERY MODE															
06/21/2007	PAPER															

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/507,524	<b>Applicant(s)</b> MIYAGAWA, KAZUHISA	
	<b>Examiner</b> Rakesh K. Dhingra	<b>Art Unit</b> 1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 4/6/07.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) 4-13 and 15-21 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☐ Claim(s) 1-3 and 14 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 September 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>09/04, 05/06</u> | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Election/Restrictions***

Applicant's election of invention of species 1 (Figure 1) {claims 1-3, 14} in the reply filed on 4/6/07 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claims 4-13, 15-21 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species, there being no allowable generic or linking claim.

### ***Information Disclosure Statement***

1) The information disclosure statement filed 5/23/06 fails to comply with 37 CFR 1.98(a)(3) because it does not include a concise explanation of the relevance, as it is presently understood by the individual designated in 37 CFR 1.56(c) most knowledgeable about the content of the information, of each patent listed that is not in the English language. In this case, English language translation/explanation of relevance of document "Japanese Office Action dated 20<sup>th</sup> April 2000" (document cited at AG in IDS) is not provided. It has been placed in the application file, but the information referred to therein has not been considered.

### ***Specification***

The disclosure is objected to because of the following informalities:

Page 7, line 24 – "id" may be corrected to "is";

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

**Claims 1, 14 are rejected under 35 U.S.C. 102(b) as being anticipated by Collins (US patent No. 5,707,486).**

Regarding Claims 1, 14: Collins teaches a plasma processing apparatus (Figures 1, 9-11) comprising: a vacuum chamber 11 wherein a gas plasma is generated by generating an electromagnetic field so as to treat an object (wafer 5) by the plasma, comprising a balanced transmission line structure 77 that is connected to a high-frequency power supply 27. Collins further teach that transmission line structure 77 comprises of two vertically disposed conductors 77, and a balun 70 (balanced/unbalanced transformer) that converts the matched power output to a balanced output. Collins also teach the transmission line has a terminal 76 which is used to attain impedance match by connecting to a matching network 28. Additionally, Collins teaches a post 53 (like a terminal) that assists in impedance matching between transmission line structure 77 and the RF source 27 (column 6, line 10 to column 8, line 55 and column 9, line 55 to column 10, line 56).

#### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nobuyuki et al (JP 11-111494).**

Regarding Claim 1: Nobuyuki et al teach a plasma apparatus (Figures 1-5) comprising:

a vacuum chamber 1 wherein a gas plasma is generated to treat an object (wafer 10) by the plasma, by an electromagnetic wave supply system comprising a coaxial track 4 (having vertically disposed conductors) and antenna 5 (making up the transmission line structure) that is connected to high-frequency power supplies 5, 13. Nobuyuki et al further teach that the transmission line structure includes plate 16 (like a terminal) that helps in impedance matching (paragraphs 0014, 0015). Though, Nobuyuki et al do not explicitly teach the transmission line is balanced, the transmission line would be obviously balanced considering that matched output is supplied at the output of antenna plate 16 as per feeding point location on the antenna structure.

Therefore it would have been obvious to one of skills in the art at the time of the invention to adjust the feeding point location on the antenna structure (on the plate 16) as taught by Nobuyuki et al in to balance the line to enable efficient supply of electromagnetic waves and generate uniform plasma.

Regarding Claim 2: Nobuyuki et al teach the electromagnetic wave supply system (coaxial track 4 and antenna 5) is disposed within the chamber 1 (Figures 1, 4).

Regarding Claim 3: Nobuyuki et al teach that gas inlet 23 is formed above the transmission line (Figure 4).

### ***Double Patenting***

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226

Art Unit: 1763

(Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

1) Claim 1 is rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 1 of U.S. Patent No. 6,657,151 in view of Collins (US Patent No. 5,707,486).

Claim 1 of patent teaches a plasma processing apparatus that produces plasma in a vacuum chamber by generating an electromagnetic field so as to treat an object by the plasma, comprising a transmission line that is connected to a high-frequency power supply and that has a short circuited end (terminal thereof) used to attain an impedance match, wherein the two conductors constituting said balanced transmission line are disposed vertically.

Claim 1 of the patent does not teach the transmission line is balanced.

Collins teaches a plasma processing apparatus (Figures 1, 9-11) comprising:

a vacuum chamber 11 wherein a gas plasma is generated by generating an electromagnetic field so as to treat an object (wafer 5) by the plasma, comprising a balanced transmission line structure 77 that is connected to a high-frequency power supply 27. Collins further teach that transmission line structure 77 comprises of two vertically disposed conductors 77, and a balun 70 (balanced/unbalanced transformer) that converts the matched power output to a balanced output. Collins also teach the transmission line has a terminal 76 which is used to attain impedance match by connecting to a matching network 28 (column 6, line 10 to column 8, line 55 and column 9, line 55 to column 10, line 56).

Therefore it would have been obvious to one of skills in the art at the time of the invention to make the transmission line a balanced transmission line by adding a balun as taught by Collins in the apparatus of Claim 1 of the patent to enable convert the matched power output to a balanced output.

2) Claim 1 is rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 4, 8, 11, 15 of U.S. Patent No. 5,314,603 in view of Collins (US Patent No. 5,707,486).

Claims 1, 4, 8, 11 and 15 of the patent teach a plasma processing apparatus that produces plasma in a vacuum chamber by generating an electromagnetic field so as to treat an object by the plasma, comprising a transmission line that is connected to a high-frequency power supply, wherein the two conductors constituting said balanced transmission line are disposed vertically.

Claims 1, 4, 8, 11 and 15 of the patent do not teach the transmission line is balanced and the transmission line has a terminal for impedance matching.

Collins teaches a plasma processing apparatus (Figures 1, 9-11) comprising:

a vacuum chamber 11 wherein a gas plasma is generated by generating an electromagnetic field so as to treat an object (wafer 5) by the plasma, comprising a balanced transmission line structure 77 that is connected to a high-frequency power supply 27. Collins further teach that transmission line structure 77 comprises of two vertically disposed conductors 77, and a balun 70 (balanced/unbalanced transformer) that converts the matched power output to a balanced output. Collins also teach the transmission line has a terminal 76 which is used to attain impedance match by connecting to a matching network 28 (column 6, line 10 to column 8, line 55 and column 9, line 55 to column 10, line 56).

Therefore it would have been obvious to one of skills in the art at the time of the invention to make the transmission line a balanced transmission line by adding a balun as taught by Collins in the apparatus of Claim 1 of the patent to enable convert the matched power output to a balanced output.

*Conclusion*

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

**1) Flamm et al (US Patent No. 6,858,112)** teach a plasma apparatus (Figure 1) comprising a chamber 12, a feed gas source 14 and a vertically disposed inductive applicator 20. Flamm et al also teach that applicator can be a transmission line and its shape and location relative to chamber is selected to provide a plasma overlying the pedestal to improve etch uniformity (column 9, lines 25-68).

**2) Glukhoy (US PG PUB No. 2003/0168172)** teach a plasma apparatus (Figures 6, 7) comprising a working chamber 21 and plurality of microwave antennas 208a-208n which comprise of coaxial lines (transmission lines) disposed in the chamber and where each microwave antenna includes a wave reflecting plug 218-218n (terminal) for phase alignment of forward and reflected waves (paragraphs 0047-0049).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rakesh K. Dhingra whose telephone number is (571)-272-5959. The examiner can normally be reached on 8:30 -6:00 (Monday - Friday).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571)-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



Art Unit: 1763

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Rakesh Dhingra



Parviz Hassanzadeh  
Supervisory Patent Examiner  
Art Unit 1763